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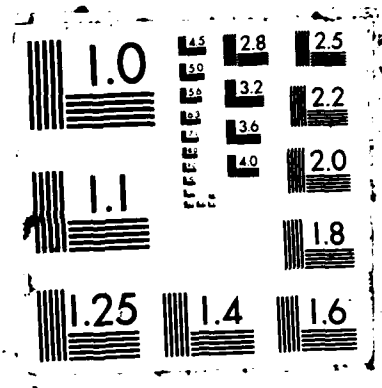
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## REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION <b>Unclassified</b>		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY <b>DTIC SELECTE</b>		3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited.	
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE <b>AUG 05 1987</b>		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) <b>CLD</b>		7a. NAME OF MONITORING ORGANIZATION Cognitive Science Program, Office of Naval Research (Code 1142CS)	
NAME OF PERFORMING ORGANIZATION Yale University		7b. ADDRESS (City, State, and ZIP Code) 800 North Quincy St. Arlington, VA 22217	
ADDRESS (City, State, and ZIP Code) New Haven, CT 06520		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER N00014-80-C-0555	
NAME OF FUNDING / SPONSORING ORGANIZATION		10. SOURCE OF FUNDING NUMBERS	
ADDRESS (City, State, and ZIP Code)		PROGRAM ELEMENT NO. 61153N	
8b. OFFICE SYMBOL (if applicable)		PROJECT NO. NR 170-912	
		TASK NO.	
		WORK UNIT ACCESSION NO.	
TITLE (Include Security Classification) The Design and Management of Work Teams			
12. PERSONAL AUTHOR(S) J. Richard Hackman			
13a. TYPE OF REPORT Final		13b. TIME COVERED FROM _____ TO _____	
		14. DATE OF REPORT (Year, Month, Day) December, 1986	
		15. PAGE COUNT 16	
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
05	10		
		Group Team Task Performance Effectiveness Work	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) This is the final report for the project, "Design and Management of Work Teams." The report describes the contributions of the project to (a) basic theory about group performance, (b) the development of research methodologies suitable for studying group task effectiveness, and (c) the accumulation of findings of use in designing and managing work teams.			
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Dr. James Lester		22b. TELEPHONE (Include Area Code) 202/696-4503	
		22c. OFFICE SYMBOL ONR1142CS	

THE DESIGN AND MANAGEMENT OF WORK TEAMS

Final Report  
ONR Contract N00014-80-C-0555 (NR 170-912)  
December, 1986

J. Richard Hackman  
Principal Investigator  
Yale University

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DTIC TAB	<input type="checkbox"/>
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Distribution/	
Availability Codes	
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THE DESIGN AND MANAGEMENT OF WORK TEAMS:  
FINAL REPORT

J. Richard Hackman  
Principal Investigator  
Yale University  
December, 1986

As set forth in the research proposal to ONR, the major aims of the current research program were:

- (a) to advance basic theory about small group performance,
- (b) to contribute to the development of research methodologies that are particularly well-suited for studying group task effectiveness.
- (c) to generate findings that are of practical use in the design and management of productive work teams, and

The research was guided by the previous conceptual work of the principal investigator (Hackman & Morris, 1975; Hackman, 1978; Hackman & Oldham, 1980). While based in theory, extensive empirical data were collected on a variety of work groups in their organizational contexts, using a diversity of research methods. Throughout, the research focussed on the design of groups (i.e., their composition, their tasks, and the core norms that guide member behavior), and on the organizational context in which they operate. This "structural" approach contrasts with the emphasis on interpersonal process that has characterized a substantial portion of previous research on small groups, and that has been found to be of limited use in actually helping work groups improve their task effectiveness (Kozlowski, 1979; Wood, Sherwood, 1980).

The project has generated findings and products in four related domains:

- (1) Theoretical and conceptual contributions to understanding group effectiveness (e.g., the development and test of theory-based propositions about the determinants of group performance).
- (2) Substantive findings about particular groups and types of groups (e.g., descriptive comparisons of different types of work teams).
- (3) Questions of research strategy, methodology and instrumentation for studying task-oriented groups.
- (4) Devices and strategies for creating, training, and managing work teams in organizations.

The accomplishments of the research are summarized below, separately for each of the four domains.

Domain One: Theoretical Contributions

1. One of the major objectives of the research was to develop a general theory of group task effectiveness, and to assess that theory empirically. The theory is set forth in a chapter in the Handbook of Organizational Behavior (Hackman, 1986a; see also Hackman, 1983). This chapter reviews current approaches to the use of teams in doing work in organizations, offers the group effectiveness model developed in the present research as an alternative, and explores the implications of the model for organizational practice.

In addition, a book-length monograph, tentatively titled Work Group Effectiveness, is now in preparation; it presents the final version of the theory of group task effectiveness, and assesses its strengths, weaknesses, and applicability using the full complement of quantitative and qualitative data that have been collected throughout the project. This monograph draws on several of the more focussed written products described below.

2. A second conceptual task had to do with the development of a new theoretical model of the group development process--that is, the way teams in organizations form and evolve over time. This work was primarily the responsibility of Connie Gersick, and is based on a major study of the life cycles of organizational project teams and task forces. Gersick's model of the life cycles of task-oriented groups differs in significant ways from traditional wisdom about the "stages" of group development: (wisdom based predominantly on findings from self-analytic groups in training settings, rather than groups with work to accomplish in a structured social system). A preliminary report on this work was distributed as a project technical report (Gersick, 1983), and the final report has been submitted for publication in a scholarly journal.

The findings of the Gersick research, coupled with those that are emerging from the action research described below, have provided an empirical basis for moving from static models of effective work teams toward a dynamic model of the process by which effective teams are formed and supported.

3. A key aspect of the group effectiveness model developed in the research is the design of the group task. The attributes of a well-designed group task in the model are adapted from those proposed for individual jobs by Hackman and Oldham (e.g., 1980). The Hackman-Oldham model of task design has received considerable empirical and conceptual attention in the last few years, and we are now writing a retrospective chapter that (a) summarizes what has been learned about the design of motivating individual and group tasks, and (b) attempts to advance the theory of group tasks based on project findings. This chapter will be published in a forthcoming volume of Research in Organizational Behavior, edited by Larry Cummings and Barry Staw.

4. A central dynamic in task-performing teams is the means by which individual group members are influenced by their teammates, often through the operation of shared norms of conduct. The principal investigator's previous chapter on this topic (Hackman, 1976) is being revised and updated based on project findings, and the new version will be published in the second edition of the Handbook of Industrial and Organizational Psychology, edited by Marvin Dunnette.

#### Domain Two: Substantive Findings

A number of studies were conducted to assess the structure and dynamics of a variety of work teams in diverse organizational circumstances and, simultaneously, to reveal the strengths and weaknesses of the project theory and methods.



In all, over 30 groups in 15 different organizations were intensively assessed using the project methodology. A highly diverse set of groups was selected, to provide the variation (in type of work, team structure, and organizational context) needed for quantitative and qualitative assessment of the team effectiveness model. The teams were studied at various points in their life cycles--some as the group was being created, others after a substantial group history had developed. A number of groups were followed longitudinally, from creation to disbandment.

A full list of the groups studied is provided in the Eighth Quarterly Report for the project submitted to DNR in July, 1982. Examples include industrial groups (e.g., a pump production team), service teams (e.g., an airline cabin crew), performance teams (e.g., a string quartet), athletic teams (e.g., a professional hockey team), management teams (e.g., a top management committee), professional teams (e.g., a federal budget analysis group), and a variety of miscellaneous groups (e.g., a team of operating room nurses, a team of deliverymen for a beverage distributorship, a group of prison guards).

In addition to the intensive study of individual teams, about 100 teams in five organizations were assessed using only the survey portion of the project methodology. These data, combined with the survey data from the groups that were intensively studied, were used for psychometric analyses of the Work Team Questionnaire, one of the key data collection

instruments developed in the research (see the section below on the methodological domain).

The major substantive product of the research program is a book titled Groups That Work (Hackman, in press), that summarizes the major descriptive findings of the project about various types of work teams. Written for use by both scholars and practitioners, the book presents in an integrative fashion project findings about how different types of groups function. The special strengths, vulnerabilities and opportunities for improved effectiveness of each major type of group researched are described and discussed.

The book begins with an introductory chapter by the principal investigator. Then come several major sections (one for each of the major types of teams studied). Chapters in these sections were written by the research collaborators who conducted intensive analyses of specific work teams as part of the overall project. The concluding chapter of each section provides a summary of what was learned from the project about that type of group. The book ends with an integrative framework that compares and contrasts the several types of groups that were studied.

Several additional reports have been completed or are in process that report project findings on particular topics. They include:

1. The Interaction of Task Attributes and Group Performance Strategies in Influencing Group Effectiveness (collaborative with Richard Guzzo and Kenneth Brousseau), being submitted for

publication to Organizational Behavior and Human Performance.

This experimental study provides insight into the conditions under which interventions aimed at changing group norms are most likely to enhance group performance effectiveness. It shows how the impact an intervention that induces discussion of group performance strategy depends on the attributes of the task being performed.

2. Predicting the Effectiveness of Self-Managing Work Teams (collaborative with David Abramis), for probable submission to the Journal of Applied Psychology or Organizational Behavior and Human Performance. This article assesses the degree to which the variables in the group effectiveness model predict independent assessments of task effectiveness, using data from teams in a microelectronics manufacturing firm.

3. Analysis of the Start-Up Dynamics of Work Teams (collaborative with other project team members), for probable submission to the Journal of Applied Behavioral Science. This article will propose and test a model of the process by which teams are formed and develop their particular patterns of interpersonal and work behavior. It will be based on two sets of project data: those that describe team start-up processes, and those that explore how members' pre-formation expectations shape subsequent patterns of group behavior. These data are from a new plant of an engine manufacturing firm, a regional airline, and a new plant that produces microelectronic components.

### Domain Three: Methodological Contributions

A number of reports describe the methods and instruments developed for use in the project, and discuss the questions of research strategy that presented themselves in the course of the research. These reports include:

1. Multiple diagnostic methods for assessing the performance-relevant features of work teams (Hackman, 1982). There there are significant difficulties in using self-report data from work team members in assessing either team dynamics or the structural features of the performance situation, and other problems associated with reliance on interview and observational methodologies. It was necessary, therefore, to develop multiple methods for assessing the features of task-performing groups, their work contexts, and their internal dynamics.

Three independent methodologies were developed, and are described in project Technical Report No. 1. In brief, they are:

- a. Guide for Observations of Work Teams. This is the "master" instrument, from which the others were derived. It provides for both behaviorally-anchored numerical assessments and qualitative descriptions of all variables in the model of group effectiveness on which the research is based. The Guide is accompanied by a detailed instruction manual.

- b. Work Team Interview Guide. The interview protocol is designed to capture, using the language and conceptual structures of group members, events and experiences relevant to the concepts in the group effectiveness model. To minimize interviewer-

supplied structure, all questions are framed in a "Tell me about a time when..." format. Interviewers do, however, make summary numerical assessments of several concepts based on interviewee responses.

c. Work Team Questionnaire. The questionnaire is a structured self-report instrument that assesses member perceptions of model-specified concepts. It consists of 109 Likert-type items plus a seven-item biographical section. Two modifications of the Work Team Questionnaire also were developed: (1) the Survey of Work Team Characteristics, which is taken by individuals who know a group relatively well but who are not members of it, and (2) the Work Team Expectations Survey, which assesses the expectations of members about their group before or shortly after it is created. These two instruments parallel the Work Team Questionnaire in structure and item content, and yield scores that are directly comparable to those obtained from it.

A final report on the project instruments (i.e., as they have been revised based on psychometric analysis) is in preparation, and will be submitted for journal publication. This article describes the instruments, reports on their structural and psychometric characteristics, and offers guidelines for their appropriate use.

2. Strategic issues in conducting research on groups that contributes both to theory and to practice (Hackman, 1985a). This chapter, published in a book on research approaches that can generate findings of use to multiple audiences, draws on

experience with the project methodology to develop strategies for research that increase the likelihood that findings obtained will be useful to both scholars and practitioners.

3. Theory and method in group effectiveness research. In an invited address at the 1983 American Psychological Association Convention, the principal investigator reviewed the present state of research and theory about group task effectiveness, and suggested some alternative conceptual and methodological directions that may offer the possibility of more fruitful research on the topic. These ideas were further developed in the keynote address for the Ninth Psychology in the Department of Defense Symposium (USAF Academy, 1984). This presentation ventured some predictions about future directions in research on work teams, and about the ways teams will be used in civilian and military organizations in the years to come. Suggestions were made for improving the quality of work team research, with special emphasis on opportunities that may be available to military psychologists. The two addresses described above are being integrated into an article on theory and method in group effectiveness research, for probable submission to the American Psychologist.

#### Domain Four: Applications of Findings and Methods

The basic conceptual and empirical work performed on the project has been enriched by the lessons learned in attempting to apply the theory and findings in on-going work organizations. The products that have emerged from these applications include:

1. Studies of the psychology of team self-management. The creation of self-managing work teams was intensively studied in a regional airline (prior to the start of operations and for several years thereafter as the teams developed), in a federal agency (for three years), and in a microelectronics firm (for four years). The findings from these applications were summarized in a chapter titled "The Psychology of Self-Management," intended for use both by psychologists and practitioners (Hackman, 1986b). (For a more general treatment of these issues as they apply to work productivity, see Hackman, 1984a).

In addition, training materials have been developed for use in helping group members (and leaders) improve team task effectiveness. These materials, which are based directly on the team effectiveness model, are now being tested with intact groups in participating organizations. When this work is completed (which will be a year or two hence), a Handbook for creating, developing, and maintaining work teams will be prepared. This Handbook will be a compilation of the training and intervention modules created for the project and tested in its action research component. Included will be guidelines and exercises for use in forming groups, building them into cohesive performing units, training them in team skills (such as managing meetings competently and negotiating effectively with organizational authorities), conducting diagnoses of team strengths and weaknesses, and intervening when problems arise.

2. Interpersonal and group factors in cockpit crew performance (Hackman & Helmreich, 1987). This chapter reviews conceptual issues and empirical findings about team-level factors that affect the performance of cockpit crews in multi-jet aircraft (with special emphasis on the safety of flight). It draws on both existing research literature and direct observations of cockpit crew behavior in commercial airlines.

3. The leadership of teams in organizations (Hackman and Walton, 1986). This chapter proposes a new model of team leadership, based on early work on leadership functions (e.g., McGrath, 1962) as elaborated by findings from the present project. Implications of the model are drawn for the diagnosis of critical leadership tasks, for the selection and training of team leaders, and for the design of leadership roles.

4. The organizational context of team performance. Two reports were prepared on this topic. The first (Hackman, 1984b) is a case study that examines the organizational context within which task-performing teams operate. This study views the organizational context as a dynamic rather than static feature of the work environment, and shows the power of contextual factors in influencing behavior in social systems. The second (Walton & Hackman, 1986) examines how two contrasting workforce management strategies, characterized by Walton (1985) as "control" vs. "commitment" strategies, shape the dynamics and performance of groups in organizations where one or the other strategy is dominant. (For an additional perspective on this phenomenon, see Hackman, 1985b).



### Conclusion

Over its life, the team effectiveness project developed into a larger and richer research undertaking than originally was anticipated. We were able to obtain high quality data for several dozen highly diverse teams, and a number of those teams became sites where the training and intervention materials (created for the action component of the project) could be applied and assessed. Also, several opportunities for studies of special interest (e.g., of the start-up of self-managing teams, of management groups that guide organizational change, of the performance of aircraft cockpit crews on line) developed as word about the research spread. By taking advantage of these opportunities as time and resources permitted, we were able to enrich the quality and diversity of our data about team effectiveness, with commensurate increases in what was learned.

On the other hand, the sheer quantity of analyses to be done and reports to be written also increased, and as a result some of the reports we hoped to have completed before the end of the contract are still being prepared. So, although the team effectiveness project is now formally concluded, the work will not end: additional articles and monographs carrying the ONR credit line will continue to appear in the months and years to come.

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